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Investigative study on managemental practices followed by Nellore Jodipi sheep farmers in Chittoor district of Andhra Pradesh

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Abstract
The present study was aimed at understanding the prevailing managemental practices followed by Nellore Jodipi sheep farmers in Chittoor district of Andhra Pradesh. The data was collected from 28 farmer families in eight villages of Srikalahasti and Yerpedu mandals. Information pertaining to various management practices was collected through observation and interaction with the flock owners using structured questionnaire. Sheep rearing was the primary occupation of the majority of farmers (92.7%) and were practicing extensive management of sheep (88.84 %). Majority of the farmers are housing their sheep near their dwellings or in separate enclosures and are sending their sheep for grazing for about 10 hours in a day. In the animal enclosures, about 85.27 % of the farmers used mud/gravel or kutcha flooring and no supplementary feed was given to sheep. Regular deworming and vaccinations were practiced by the farmers at the behest of department of animal husbandry.

Keywords: Breeding, feeding, health, housing, Nellore Jodipi, questionnaire

1. Introduction
Livestock play a pivotal role in upholding socioeconomic status of rural farmers and also greatly contributes to food production especially in developing countries like India. Globally, sheep accounts for 25% of the total mammalian breeds and also are the species with the highest number of documented breeds (Gebremichael, 2008) [1] and it was one of the earliest species to be domesticated (Daly *et al*., 2021; Nomura *et al*., 2013) [2, 3]. Further, the only species that can use wastelands, crop residue, tree toppings, farm wastes and other agricultural by products to produce meat, wool and skin is the sheep. Sheep farming continues to be practised by the rural shepherd communities or by poor and socioeconomically disadvantaged sections of the society mostly in the traditional extensive system of rearing (Rajanna *et al*. 2012) [4].

According to the livestock census, 2019, there were around 74.26 million sheep in India, an increase of 14.13 % over the 2012 census. The number of sheep in Andhra Pradesh state has increased steadily over time, reaching 12.18 million in 2007, 13.56 million in 2012 and 17.6 million in 2019. Between 2007 and 2012, the percent growth in sheep populations was 11.33 and between 2012 and 2019 it was 29.79 (BAHFS, 2020 and 20th Livestock census, 2019) [5] [6]. Out of total meat production in India, small ruminants produce 2226.16 million kg of meat (23.96%). The states of Andhra Pradesh, Telangana, Tamil Nadu, Rajasthan and Karnataka add up to 88.77% of the total mutton production of the country (Gadekar *et al*., 2023) [7].

The indigenous sheep breeds of arid and semi-arid parts of India have their adaptive mechanism of altering cellular, physiological, biochemical, neuroendocrine and molecular processes to combat the stress (Naqvi *et al*., 2017) [8]. Nellore sheep is the predominant indigenous meat purpose sheep breed in Andhra Pradesh and Telangana regions of southern India and on the basis of colour is distinguished into Brown (Dora), Jodipi (White with black) and white (Palla) varieties/strains (Reddy *et al*., 2020) [9].

Nellore brown is distributed in Rayalaseema region, Nellore Palla is restricted to only Atmakur mandal of Nellore district, whereas Nellore Jodipi is widely distributed in all the regions of the state and also in adjoining areas of Telangana. These are relatively tall animals with little hair except at the brisket, withers and breech. The males are horned while the females are almost always polled and the ears are long and drooping, the tail is short and thin and a majority of the animals have wattles. Nellore is known for heat tolerance, disease resistance and also thrives well in harsh conditions.

Documenting the existing rearing practices of Nellore Jodipi sheep farmers will help in designing strategies to improve the sheep husbandry practices for improving the returns from the small ruminants, thereby enhancing socioeconomic status of impoverished farmers (Zaw Win *et al*., 2019) [10]. In light of these, the current study was conducted to evaluate the status of existing managemental practises adopted by sheep farmers in Chittoor district of Andhra Pradesh under field conditions.

2. Materials and Methods

The data for the present study was collected from Nellore Jodipi sheep farmers in its breeding tract at Chittoor district of Andhra Pradesh during the period of July – October, 2021. Chittoor district (Fig.1) is one among the four districts in Rayalaseema zone of Andhra Pradesh and is located at the extreme south of the state of Andhra Pradesh between the 12°37′ - 14°8′ of Northern Latitude (N) and 78°3′ - 79°55′ of Eastern Longitude (E) with Tropical wet and dry climate to Hot semi-arid climate. The district covers 15,359 square kilometres (5,930 square miles) at a height of 333.75 m (1,094.98 ft) from sea level. The average maximum and minimum temperature ranges from 36° - 44 °C and 12 °C - 18 °C, respectively, with an average rainfall of about 918.1 mm. Red loamy (57 %) and red sandy (34 %) were the two most common soil types and black soils (black clay, 3%; black loamy, 2%; black sandy, 1%; and red clay, 3%), which made up the remaining 9%, were the least common.

Fig 1: Andhra Pradesh map showing Chittoor District

Fig 2: Map of Chittoor District showing Mandal's under study

For the present study, eight villages were selected from Yerpedu and Srikalahasti mandals (Fig. 2) in Chittoor district. A total of 28 farmers rearing Nellore Jodipi sheep were chosen randomly and directly interviewed and information on various management and animal husbandry practices was gathered through observing and interacting with flock owners and shepherds at the farms using structured questionnaire. Data on management practices *viz*., housing, feeding, breeding, grazing, health were gathered and was turned into a percentage.

3. Results and Discussion

3.1 General management practices

The three most popular methods of sheep farming are extensive, semi-intensive and intense. The analysis of the farming practises used by the farmers showed that the majority (88.84 %) used an extensive system for raising sheep (Fig. 3), taking the animals for grazing through forests, village common grazing fields and green spaces by the side of the road (Fig. 4). Of the respondents, 11.16 % used the semi-intensive raising (Suresh *et al*., 2008) [11]. The Nellore Jodipi sheep rearers in the study region are not practicing intensive system. These are in agreement with findings of Kumar *et al*., (2003) [12] in Kheri and Malpura sheep, Thiruvenkadan *et al*., (2004) [13] in Mecheri, Mishra *et al*. (2004) [14] in Ganjam, Kumar *et al*., (2006) [15] and Dass and Prasad (2007) [16] in Muzaffarnagari sheep. Absolute percent (100%) of the flocks are non-migratory/stationary in nature. These results also revealed about the common type of sheep rearing practises followed in the Indian subcontinent (Shinde and Sejian, 2013) [17].

Fig 3: Nellore Jodipi sheep flock

Fig 4: Extensive system of rearing

Sheep rearing was the primary occupation of the majority of farmers (92.7%) in this district of A.P., whereas it was the secondary occupation of 7.3%. These findings were in conformation with studies of Rao, 2012 [18] in Prakasam and Lavanya *et al*., 2016 [19] in Nellore districts of Andhra Pradesh. Sheep rearing is a traditional occupation of the economically weaker section of this district and they earn a substantial income and dependable source of their livelihood from this occupation. Most of the sheep rearing families are small to marginal farmers. The flock size varies from 5 to 65 sheep per family (Sahana *et al*., 2004, Dixit *et al*., 2005, Porwal *et al*., 2006) [20, 21, 22]. The excellent meat quality of these sheep and high returns by the sale of lambs has made these sheep very popular among the farming community in this area.

3.2 Housing practices

According to the present investigation, the majority of sheep farmers (81.72%) kept their flocks in thatched shelters made of coconut/palmyra leaves or wild grasses, while the remainder 18.28% kept their livestock in temporary buildings constructed of metal or tarpaulin sheets, asbestos or galvanised iron roofing and kutcha floors (Fig. 5a & 5b). This is consistent with Reddy *et al*. (2020) [9], who found that the majority (67 %) of sheep shelters had thatched roofs, whereas 25% of the homes used asbestos and 2% had tiled roofs and also with Sharma (2001) [23] who observed that kutcha houses are maintained by 88% of farmers. The findings of Sorathiya *et al*. (2016) [24], who reported that the majority of goat farmers (51.17%) provided reinforced cement concrete poles for pillars in goat shelters, are in contrast to this.

To keep housing costs as low as possible, almost all sheep owners employed locally available low-cost materials like wooden logs, bamboos, jute, coconut leaves, palm leaves, local tree leaves and other wild forest grasses. For the ultimate purpose of securing the sheep from threats posed by theft or predators, farmers housed their sheep in enclosures in the backyard next to their homes, or in their agricultural fields during the night (Thiruvenkadan *et al*., 2004, Rajapandi, 2005 and Kumar *et al*., 2006) [13, 25, 15]. The findings of Sireesha *et al*. (2014) [26], who noted that 60.70 % of the shepherds housed their sheep closer to the dwelling home were comparable with the present findings. Some of the farmers kept their animals in the same shed along with other livestock like cattle, buffalo, goats etc (Fig. 6a & 6b). No special housing was provided during lambing and lambs are kept along with other animals, which are contrary to the findings of Chandran *et al*. (2009) [27] who observed the provision of temporary shelter called “Koodu” to Vembur lambs during day time and Gangaraju (2010) [28] who reported use of temporary lamb enclosures.

Fig 5a & 5b: Different models of housing Nellore Jodipi Sheep

Fig 6a & 6b: Housing of Nellore Jodipi Sheep along with Cattle

The animals were hauled out of the shed early in the morning and placed in open pens before being taken for grazing. These enclosures, which were mainly made of bamboos or native plant materials, were used to confine the animals before freeing them to graze in the nearby forests. About 86.3 % of farmers fully sweep and clean the sheds daily, while 13.7 % only do so once a week or as often as it is convenient for the farmers. About 85.27% of the farmers provided mud/gravel or kutcha flooring (Fig. 5 & 6) in the animal enclosures, while the remaining had employed pucca flooring with cement, stone slabs or bricks.

3.3 Feeding and grazing

The sheep in the study area are raised entirely on grazing with little input under extensive range system (Chaturvedi *et al*., 2002; Sahana *et al*., 2004) [29, [20]. The grasses growing naturally in the area are extensively grazed by the animals. No cultivated grass was fed to the animals. They graze along boundaries of field, grasses and shrubs on the roads side, on the bank of river, in the nearby forests and hills and also on the inundated fields. The main source of feeds was grasses, herbs, stubbles and tree leaves in nearby fields and forests (Thiruvenkadan *et al*., 2004; Kandasamy *et al*., 2006; Devendran *et al*., 2010) [13, 30, 31].

The animals are taken for grazing between 7.00 AM to 8.00 AM and return with sunset, and are thus grazed for about 10 to 11 hours in a day (Rajapandi, 2005; Kumar *et al*., 2006; Singh *et al*., 2007) [25, 15, 32]. During extreme summer of the year, flocks are grazed in early hours of the day that is from 6 AM to 11 AM and again from 4 PM to 6 PM. The sheep were reared on grazing alone and no concentrate was given to them. The source of water for these animals was usually the river, canal or pond water alongside the grazing areas.

Major fodder trees in this area are Neem (*Azadiracta indica*), Subabul (*Leucaena leucocephala*), Avisa (*Sesbania grandiflora*) and Dirisena (*Albezia lebeck*). *Ficus bengalensis* and *Ficus religiosa* and Tumma (*Acacia nilotica*) are the minor fodder trees. *Heteropogon contortus*, *Sehima nervosa*, *Cymbopogan citratus*, *Cynodon dactylon* and *Dichanthium annulatum* etc. grasses are seen on pasture lands. The feeding of young lambs with tree leaves was practised by 89.75 % of sheep owners. Neem, Casuarina, Tamarind, Babul/Acacia, Subabul, Agathi/Sesbania and other forest grasses were commonly utilized as sources of tree leaves.

3.4 Health coverage

Regular deworming and vaccination were practiced by the farmers with the help of State Animal Husbandry department (Swarnkar *et al*., 2010; Rao *et al*., 2013; Rajanna *et al*. 2013; Vani *et al*., 2017) [33, 34, 35, 36]. On the other hand, according to Pattanayak *et al*. (2003) [37], sheep farmers in Orissa did not adhere to a deworming or vaccination regimen for their flocks. Some of the farmers usually prefer the traditional method of treatment for their animals but mostly take the animals to Veterinary dispensaries of that locality.

3.5 Breeding practices and Marketing

Ewes were found to be bred throughout the year. The breeding ram always remain in the flock and only natural mating was practiced (Devendran *et al*., 2010; Karunanithi *et al*., 2005; Rao *et al*., 2008) [31, 38, 39]. Matured rams were sometimes selected according to their vigour and service performance for breeding. However, some farmers select and grow their own rams for their own flock. Rams were left with ewes to graze in the field. Rams were usually replaced after 3 to 4 breeding seasons. Lambs were allowed to suckle and remain with their dams up to three months of age, after with they will be allowed for grazing along with the flock (Dixit *et al*., 2005) [21].

There is a great demand for mutton in the state and also within the locality. The animals will be marketed at the age from 3-12 months in the village itself or in the local fairs/shandy or through middle men. Mostly live animals were sold and the price of animals depends on the weight of the

individual animal and also on the specific seasons of the year where high demand for the sheep meat was noticed.

4. Conclusion

The current study's sheep rearing practices are a very low input, low output system that offers farmers a reasonable income and employment. With supplemental feeding, lambs birth weight and growth rates may be increased. The state government, veterinary and animal husbandry institutions should take on the task of educating farmers on cutting-edge and scientific sheep managemental practises through trainings and demonstrations in order to improve the reproductive and productive performance of the sheep with the aim of achieving financial sustenance. Along with the interventions already mentioned, the government should improve the infrastructure for the processing and value addition of livestock products, the availability of credit to the livestock industry, the expansion of market access, the establishment of organised market links, and the recruitment of more and more Central Government support for the state's livestock sector.

5. Acknowledgement

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6. Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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